The Greening of Marshall University: Examining the Effects of Campus Conservation Projects on the Student Experience

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1.0 Introduction

Conservation and sustainability have become increasingly important issues in an era of rapid human development and environmental change. As beacons of wisdom and progress, universities serve as important places where people can learn, both formally and informally, about important and emerging contemporary issues. Thus, it is not surprising that many universities have been overtly increasing their efforts to conserve the environment and operate in as sustainable a manner as possible. Marshall University (MU) has undertaken many projects to promote informal education focused on conservation and sustainability over the past several years. Some of these projects include the creation of a rain garden to improve storm water management, monarch butterfly waystations, a student community garden, a green roof, and an annual Earth Day celebration. Further, many new projects are in the planning and development stages (e.g., tree mapping and establishment of a campus arboretum, improved educational signage at various project locations, an additional green roof to be located on a new engineering building, and a "green trail" connecting all of these projects). While the environmental benefits of such projects have been well-documented, less is known regarding the effect of such campus-wide projects on the student experience (i.e., the social benefits). For example, do Marshall University students believe that the existence of such projects enhances their college experiences? Do they feel a greater sense of environmental responsibility or satisfaction as a result of enrolling at a university that is committed to environmental sustainability and stewardship? Are students who interact with campus conservation initiatives more likely to exhibit ecological attitudes and pro-environmental behaviors in their own lives? The purpose of this study was to examine the social benefits that students receive as a result of campus conservation projects, and to explore relationships between exposure to these projects and general environmental views and behaviors.

2.0 Background / Literature Review

Higher education institutions across the nation and world have begun to emphasize the importance of environmental conservation and sustainability. This should come as no surprise in an era following the environmental disasters and subsequent legislative reforms that occurred in the latter half of the 20th century. The emphasis that modern higher education systems place on environmental conservation and sustainability is a natural reaction to a changing environmental consciousness in society and is fueled in large part by the students and faculty who attend such institutions. Smith (1993, pg. xi) explained,

> *Since Earth Day 1990, an explosion of environmental activity has occurred at the campus level. Hundreds of student environmental groups have formed on college campuses. In response to student and faculty interest, schools are creating and expanding environmental education programs. College and university presidents are answering the international call to action for environmental literacy. Campus professional associations are placing environmental issues on their national agendas. More than ever before, campuses are recycling, exploring energy-efficiency technologies, purchasing environmentally friendly products, and reducing their use of hazardous substances.*

Many university systems are publicly endorsing such actions in one way or another. For example, at the time of writing this article more than 680 university presidents/administrators had signed the American College and University Presidents' Climate Commitment, publicly acknowledging human-caused global climate change and pledging institutional commitments to reduce and/or eliminate greenhouse gas emissions resulting from specified campus operations (acupcc.org, 2015). In addition to operational commitments and a growth in formal educational programs focused on the environment, many universities have embraced informal education for their students and visitors by establishing and showcasing outdoor conservation initiatives (e.g., arboretums, gardens, etc.). An implicit purpose of such initiatives is to educate all members of a university (including those who do not choose a major related to the environment) about issues surrounding conservation and sustainability.

As large-scale universities possess and consume vast resources, their commitment to operate in a more sustainable manner has a large, though perhaps difficult to measure, positive impact on the environment. However, some might argue that this impact is miniscule in comparison to the potential impact that students might have if they apply conservation messages and sustainable practices in their own lives or careers. Coy et al. (2013, pg. 49) argued, "it is not enough for administrators to develop programs that should have positive environmental impacts; student behavior ultimately will be the driving force that determines program success". For example, providing recycling bins on campus is a step in the right direction, but it is truly up to university students and personnel whether they choose to use those facilities or simply throw their recyclables in the garbage. Similarly, installing a single living roof on a university building will have a relatively low environmental impact in comparison to the impact that would result from 10, 100, or 10,000 students installing living roofs in their homes or workplaces after graduation. Thus, there is a need to examine how students interact with various campus conservation initiatives, what factors influence their endorsement or engagement with such initiatives, and how engagement with initiatives influences other environmental attitudes and behaviors.

A few studies have begun to document college student perceptions of sustainability. In a study of Alabama and Hawaii university students, Emanuel and Adams (2011) found that a majority of students reported being concerned about the wasteful consumption of natural resources and the destruction of the environment. Further, a majority agreed with a statement indicating that our current economic system is based on practices that will result in negative consequences for future generations. However, only a minority of students reported that they knew a great deal about the environment, with nearly one-third of students reporting that they did not know much about sustainability. They also found that a majority of students believed that universities should make sustainability a priority in their planning, development, and operations. However, students who felt that it is necessary for their school to include environmental education across the curriculum were in the minority. The authors highlighted the need for future researchers to monitor changes in student commitment to campus sustainability as such activities become more mainstream and mature.

Several other studies have examined the connection between peoples' environmental attitudes and pro-environmental behaviors – such relationships are often found but are commonly weak and lacking in explanatory power. Thapa (1999) examined environmental attitudes and behaviors among college undergraduate students using the New Ecological Paradigm (NEP) Scale and the Environmentally Responsible Behavior Index. Although students were found to be sympathetic to the environment and supportive of the NEP ideology, their participation in most environmental behaviors was lacking. Like several previous studies, he found only a weak relationship between environmental attitudes and behavior. Results suggest that although many individuals like to consider themselves as environmentalists, such perceptions likely do not have a strong influence on personal participation in behaviors that support the environment.

Theodori and Luloff (2002) surveyed Pennsylvania residents to examine factors that may influence participation in pro-environmental behaviors. They found that persons having different positions on the environment vary in regards to their sociodemographic characteristics. In particular, those having more proactive positions on the environment tended to be younger, more educated, have higher incomes, and were more likely to have a liberal political orientation. Further, those with neutral positions on the environment tended to engage in pro-environmental behaviors less often than those with sympathetic or proactive positions.

3.0 Methods

An online survey was developed using Qualtrics software to understand student perceptions and attitudes towards current and future environmental projects on campus. Simple random sampling was employed to obtain a representative sample of current university students. Only students who were at least 18 years old and were enrolled in at least one traditional course at the Huntington campus during the Fall, 2014 semester were included in the sampling frame (students at other campuses or students enrolled only in online courses were excluded). The survey was distributed via email to 5,000 students during the fall semester of 2014. The sampling technique followed the Dillman Tailored Design method (Dillman, Smyth, & Christian, 2009). Methods employed to reduce bias/error include (1) presenting survey questions in a random order, (2) requiring a response to primary study questions (to avoid missing data), and (3) preventing ballot box stuffing from within the Qualtrics system.

Several variables were included on the questionnaire to better understand how campus conservation initiatives affect students at Marshall University. Study variables were measured as follows:

Engagement with campus conservation initiatives – students were asked to indicate their level of engagement with 13 different conservation initiatives (i.e., facilities or services) on campus using a scale from 0 (I was unaware of this facility/service) to 2 (I have personally visited /used this facility or service. Scores for the 13 items were summed to create an overall measure of engagement. Descriptions of the 13 conservation initiatives included in this survey are provided below:

- University Greenhouse – a popular resource for instructors and student groups, the greenhouse is often used to enhance course instruction, to serve as a setting for research projects, and to provide student organizations with space for growing plants throughout the year. The greenhouse serves as a nursery for most of the plants that are grown in the various conservation-oriented gardens around campus.

- Oasis Water Bottle Fill Stations – located in several campus buildings, water bottle fill stations provide students with filtered drinking water and an easy method for refilling permanent water bottles. Oasis stations encourage students to reuse water bottles instead of purchasing plastic bottles (which costs money and produces waste).

- Annual Earth Day Celebration – a special event is held each year to honor Earth Day. The event brings students, faculty, staff, businesses, governmental agencies, community groups, and others together to celebrate and promote environmental conservation and sustainability.

- Student Community Garden – several raised beds have been installed on campus to provide the student body with gardening space. Many students enjoy growing their own herbs and vegetables throughout the year.

- Monarch Butterfly Waystation – centrally located and highly visible, the monarch butterfly waystation provides habitat for butterflies and other pollinating insects. The garden is officially certified by the Monarch Watch program and is used to educate students and visitors about the invaluable ecological services that pollinating insects provide as well as their recent decline in populations.

- Rain Garden – though not centrally located, the rain garden helps to reduce flooding and storm water runoff, and serves as a useful teaching resource.

- Living Roof – recently installed on the Science Building, the living roof provides several benefits. In addition to its aesthetic appeal, the living roof reduces the need for heating and air conditioning by providing insulation, and also provides habitat for native wildlife.

- EcoCycle Bike Loan Program – a valuable resource for the Marshall community, free bike rentals are available to university members. The bike loan program helps students to get around town without the need for a motor vehicle, which helps to reduce pollution and promotes personal health and fitness.

- Student Yard Sale – provides students with a convenient way to sell (and repurpose rather than waste) personal belongings. The event is particularly beneficial to students who are moving into or out of the campus residence halls.

- Annual Water Festival – held each fall, the water festival is an event that benefits local K-12 students by providing hands-on activities focused on water conservation education. Several activities are planned by various campus groups (faculty, student organizations, sustainability department, etc.) to provide a high-quality event for local youth.

- Residence Hall Energy Conservation Competition – designed to educate students about conservation and sustainability, the residence hall competition tracks water and energy usage within each of the residence halls and awards the winning residence hall with a trophy and bragging rights. Throughout the event, signs are posted throughout the residence halls informing students of easy ways to alter their daily routines that will help to conserve water and energy (e.g., turning the faucet off while brushing teeth).

- Sustainability Lecture Series – opened to the entire Marshall Community, the sustainability lecture series hosts guest speakers (often industry professionals) to discuss current issues, trends, and sustainable products and practices.

- Greening Marshall Committee – a group consisting of sustainability department personnel, students, faculty, and staff who meet monthly to discuss ideas to enhance environmental stewardship and sustainable practices at the university and in the broader community.

Source of knowledge for campus conservation initiatives – students were asked to indicate where they had learned about any or all of the 13 different campus conservation initiatives included in the survey. Respondents were provided with a list of sources and asked to check all that applied. Students were also given the opportunity to indicate other sources that were not included in the list.

Satisfaction from Campus Initiatives – students were asked to indicate how the presence of the 13 conservation initiatives at MU influenced their satisfaction as students at MU using a scale from 1 (greatly decreased my satisfaction) to 5 (greatly increased my satisfaction).

Environmental Worldview – students were asked to indicate their agreement or disagreement with six statements from the New Ecological Paradigm Scale (Dunlap, Van Liere, Mertig, & Jones, 2000). Each item was measured on a five-point Likert scale, and then all six items were summed to create an overall measure of environmental worldview (negative items were reverse coded so that a high score on each item indicated a pro-NEP response). The six items included in the survey were chosen to represent different dimensions of the scale (e.g., limits to growth, balance of nature, antianthropocentrism, rejection of exceptionalism), and are shown in Table 7.

General Environmental Behavior – students were asked to indicate how often they engaged in general pro-environmental behaviors using a five-point scale ranging from never to always (items were adapted from Theodori & Luloff, 2002). Scores for the individual behavior items were summed to create an overall measure of pro-environmental behavior.

MU Commitment to Sustainability – students were asked to rate Marshall's overall commitment to sustainability using a scale from 1(very weak) to 5 (very strong). This variable represents student *perceptions* of MU's commitment to sustainability.

Importance of MU's Commitment to Sustainability – students were asked to indicate how important MU's commitment to sustainability was to them personally using a scale from 1 (very unimportant) to 5 (very important).

4.0 Results

A total of 906 students completed the survey in its entirety, yielding an 18.1% response rate. While the 18.1% response rate of this study is quite respectable in comparison to the norm for *online* surveys, it is generally low in comparison to other survey modalities and raises questions regarding the representativeness of the sample. Due to study constraints, a nonresponse bias check (i.e., follow-up) involving telephone contacts was not possible. However, a demographic comparison of the student sample and the overall study population suggests a high level of representativeness (Table 1).

Table 1. Sample and Population Characteristics

Characteristics		**Study Sample (n = 906)**	**Study Population (N = 10,575)**
Age			
	Min	18	18
	Max	68	86
	Mean	23.3	23.4
Sex			
	Male	35.1%	44.1%
	Female	64.9%	55.9%
Standing			
	Freshman	22.1%	21.5%
	Sophomore	15.0%	17.9%
	Junior	13.8%	16.1%
	Senior	24.1%	25.6%
	Graduate	17.8%	13.3%
	Pharmacy	2.2%	2.0%
	First Professional	5.1%	3.7%

4.1 Effects of Campus Conservation Initiatives

Students were asked to indicate their level of engagement with 13 different conservation initiatives on Marshall University's Huntington campus. Results show that many of the campus conservation initiatives at Marshall University were not well-known to the student body (Table 2). However, this may be partially explained by the fact that 22% of respondents were freshmen who did not have as much time or opportunity as upperclassmen to experience the various campus initiatives included in the survey. The most well-known initiative was the campus greenhouse (66.8% of students had heard of or had personally visited this facility), followed by the annual earth day celebration (60.3%), the student community garden (57%), the OASIS water bottle fill stations (52.9%), the ecocycle bike loan program (50.4%), the student yard sale (40.3%), the living roof on the science building (33.9%), the Monarch Butterfly waystation and pollinator gardens (28.4%), the annual water festival (26%), the residence hall energy conservation competition (21.8%), the rain garden (20.1%), the sustainability lecture series (19.1%) and the Greening Marshall Committee monthly meetings (18.8%).

Students were also asked to report how they had learned about conservation initiatives on campus (Table 3). The most common source of information about these projects was personal exploration on campus (65.7%), followed by an email or electronic newsletter (34.7%), a course or professor (24.0%), a website (12.1%), the Parthenon (a student-run university newspaper) (10.7%), another print source (7.4%), and televised news (2.8%). Eleven percent of respondents indicated that they learned about these initiatives from some other source not listed on the questionnaire. Other sources of information reported by students include friends/classmates (n=45), through employment at the university (n=4), Facebook or other social media (n=3), and a student organization or club (n=1).

Table 2. Student Knowledge of and Engagement with Campus Conservation Facilities and Services

Campus Conservation Initiatives	I was unaware of this facility or service (0)	I've heard of this facility/ service, but have not visited/used it. (1)	I've personally visited/used this facility/service (2)	Mean
OASIS Water Bottle Fill Stations	47.1%	19.8%	33.1%	0.86
Campus Greenhouse	33.2%	53.4%	13.4%	0.80
Annual Earth Day Celebration	39.7%	41.1%	19.2%	0.79
Student Community Garden	43.0%	44.6%	12.4%	0.69
EcoCycle Bike Loan Program	49.7%	42.3%	8.1%	0.58
Student Yard Sale	59.7%	33.0%	7.3%	0.48
Living Roof (Science Building)	66.1%	25.5%	8.4%	0.42
Monarch Butterfly Waystation and Pollinator Gardens	71.5%	18.4%	10.0%	0.39
Annual Water Festival	74.1%	20.8%	5.2%	0.31
Residence Hall Energy Conservation Competition	78.3%	15.8%	6.0%	0.28
Rain Garden	79.9%	16.6%	3.5%	0.24
Sustainability Lecture Series (AKA Lunch and Learn)	80.9%	15.9%	3.2%	0.22
Greening Marshall Committee Monthly Meetings	81.2%	16.8%	2.0%	0.21

Table 3. Sources of Information regarding MU Conservation Projects

Source of Information	% of respondents*
Personal exploration on campus	65.7
An email or electronic newsletter	34.7
A course or professor	24.0
A website	12.1
The Parthenon Newspaper	10.7
Other print source	7.4
Televised news	2.8

*Students were asked to check all that applied, so percentages do not add up to 100%

Students were also asked to indicate how the presence of campus conservation initiatives influenced their satisfaction as students at Marshall. Results indicate that the existence of campus conservation projects increases student satisfaction at Marshall University. About 40% of respondents reported that the existence of conservation projects on campus either increased or greatly increased their satisfaction as students at Marshall (Table 4). The majority of students (59%) indicated that the existence of such projects did not have any influence on their satisfaction. However, this result is partially due to the fact that many of the conservation projects on the Huntington campus were unknown to the majority of current students (over 50% of respondents had not heard of 8 out of the 13 conservation projects listed on the survey).

Table 4. Influence of Campus Conservation Projects on Student Satisfaction

	Greatly Decreased Satisfaction (1)	Decreased Satisfaction (2)	Neutral / No Influence on Satisfaction (3)	Increased Satisfaction (4)	Greatly Increased Satisfaction (5)	Mean
Influence on Satisfaction	0.7%	1.0%	58.9%	34.7%	4.7%	3.42

4.2 Student Perceptions of Marshall's Commitment to Sustainability

Nearly half of respondents felt that Marshall's overall commitment to conservation and sustainability was strong or very strong (Table 5). Only about 10% felt that Marshall's commitment was weak or very weak, while a substantial proportion provided neutral or no opinion responses. Of course, these data represent general student perceptions, as opposed to a conscientious and objective effort to measure such a commitment. Perhaps more importantly, the majority of students felt that Marshall's commitment to conservation and sustainability was important or very important to them personally (Table 6). Only 6% of respondents felt that Marshall's commitment was unimportant to them personally.

Table 5. Student Perceptions of Marshall University's Commitment to Conservation and Sustainability

	Very Weak (1)	Weak (2)	Neither Strong nor Weak (3)	Strong (4)	Very Strong (5)	Don't know / No Opinion
Marshall's Commitment to Sustainability is…	2.0%	8.5%	30.6%	37.5%	7.5%	13.9%

Table 6. Personal Importance that Students Place on Marshall University's Commitment to Conservation and Sustainability

	Very Unimportant to Me (1)	Unimportant to Me (2)	Neither Important nor Unimportant to Me (3)	Important to Me (4)	Very Important to Me (5)	Don't know / No Opinion
Marshall's Commitment to Sustainability is…	1.9%	4.1%	22.0%	44.0%	20.4%	7.6%

4.3 General Environmental Attitudes and Behaviors

A six-item version of the NEP scale was used to measure general environmental attitudes. A fair amount of variation was found, as each of the six statements had substantial proportions responding on each end of the scale (Table 7). Most item means were close to the neutral point of the scale (i.e., between 2.75 and 3.99).

Table 7. General Environmental Attitudes (NEP Items)

NEP Items	Strongly Disagree (1)	Disagree (2)	Neither Agree nor Disagree (3)	Agree (4)	Strongly Agree (5)	Mean
We are approaching the limit of the number of people the Earth can support.	6.1%	18.5%	30.5%	30.4%	14.6%	3.29
Humans were meant to rule over the rest of nature.*	20.3%	24.4%	25.4%	20.2%	9.7%	2.75
When humans interfere with nature it often produces disastrous consequences.	2.0%	8.7%	27.9%	43.3%	18.1%	3.67
The Earth has plenty of natural resources if we just learn to develop them.*	2.6%	12.7%	17.8%	47.0%	19.9%	3.69
Human ingenuity will insure that we do NOT make the Earth unlivable.*	6.3%	21.0%	40.3%	26.6%	5.8%	3.05
Plants and animals have as much a right as humans to exist.	3.3%	6.7%	15.8%	36.1%	38.1%	3.99

*Item subsequently reverse-coded to create the summated overall measure of environmental worldview.

A series of questions was included to learn more about various pro-environmental actions that students may take in their day to day lives. Students were asked to rate how often they participate in a variety of general environmental behaviors on a scale from 1 (never) to 5 (always). General environmental behaviors that were most common among students tended to be those that required relatively less time, money, or personal effort (Table 8). For example, the highest mean participation rates were for activities such as product purchasing, voting behavior, and watching television specials or reading magazines about environmental issues. As might be expected, more intensive environmental actions that would require significant time or effort were not as common among the student body (e.g., contacting a governmental agency, attending public hearings, contributing time or money to a cause).

Table 8. Student Engagement in General Environmental Behaviors

Environmental Behaviors	Never (1)	Rarely (2)	Sometimes (3)	Often (4)	Always (5)	Mean
I will stop buying a product if it causes environmental problems.	9.2%	18.4%	42.5%	22.3%	7.6%	3.01
I vote for or against a political candidate because of his/her position on the environment.	24.0%	16.7%	32.7%	17.8%	8.9%	2.71
I watch television specials on the environment.	17.7%	25.1%	34.9%	17.8%	4.6%	2.67
I read conservation or environmental magazines, blogs, or newsletters.	30.5%	27.3%	27.3%	12.1%	2.9%	2.30
I contribute time or money to an environmental or wildlife conservation group.	41.7%	24.1%	24.6%	7.1%	2.5%	2.05
I enroll in university courses focused on environmental problems and solutions.	55.7%	25.9%	11.1%	5.3%	1.9%	1.72
I attend public hearings or meetings about the environment.	59.7%	24.2%	12.6%	2.8%	0.8%	1.61
I contact a government agency to get information or complain about an environmental problem.	64.8%	21.0%	10.3%	3.1%	0.9%	1.54

4.4 Correlation Analysis

Pearson correlations were obtained to explore linear relationships between study variables. For the purposes of correlation analysis, individual items used to measure more global constructs were summed to create overall measures (e.g., overall engagement with campus conservation initiatives, environmental worldview, and overall pro-environmental behavior). Alpha values ranged from .851 to .516, suggesting an acceptable level of reliability. Several meaningful relationships were found between study variables (Table 9).

Table 9. Correlation Matrix

	Conservation Initiative Engagement	Satisfaction Resulting from Initiatives	Environmental Worldview (NEP)	General Environmental Behavior	MU's Commitment to Sustainability	Importance of MU's Commitment to Sustainability
Conservation Initiative Engagement	1	.334**	.096**	.407**	.126**	.191**
Satisfaction Resulting from Initiatives		1	.156**	.280**	.163**	.300**
Environmental Worldview (NEP)			1	.319**	-.135**	.247**
General Environmental Behavior				1	-.049	.392**
MU's Commitment to Sustainability					1	.090*
Importance of MU's Commitment to Sustainability						1

** Correlation is significant at < .001 level; *Correlation is significant at the .05 level

Personal involvement with conservation initiatives on campus was significantly related to student satisfaction at MU (r = .334). In other words, students who reported higher levels of engagement with campus conservation initiatives were more likely to indicate that the presence of such initiatives increases their satisfaction as students at MU.

A significant, but weak, correlation was found between student knowledge/engagement with campus initiatives and student perceptions of MU's overall commitment to sustainability. (r = .126). A slightly stronger correlation was found between engagement with campus initiatives and student perceptions of the ***importance*** of MU's commitment to sustainability (r = .191). In other words, students who had higher levels of engagement with campus conservation initiatives tended to perceive MU's efforts in relation to conservation as being stronger and also tended to place more personal importance on MU's commitment to conservation. Environmental worldview (NEP) and participation in general pro-environmental behaviors had stronger associations with student perceptions of the ***importance*** of MU's commitment to sustainability (r = .247 and .392, respectively). Students who reported a more ecological worldview and who engaged in general pro-environmental behaviors more often tended to perceive campus conservation initiatives as being more important. Interestingly, environmental worldview and general pro-environmental behavior were both negatively correlated with perceptions of MU's overall commitment to conservation and sustainability (i.e., they tended to rate MU's commitment as being weaker). A plausible explanation for this finding is that those who reported more ecological worldviews and more frequent participation in pro-environmental behaviors may have evaluated MU's conservation and sustainability efforts more critically (i.e., they may have expected more effort than those who reported a dominant/utilitarian worldview and those who personally engaged in pro-environmental behavior less often).

A significant, but very weak, correlation was found between student engagement with campus conservation initiatives and environmental worldview (r = .096). In other words, there was not a great difference in campus conservation initiative engagement between those with ecological worldviews and those with more dominant/utilitarian worldviews. However, a much stronger correlation was found between campus conservation initiative engagement and general pro-environmental behaviors (r = .407). Students who reported a higher amount of engagement tended to take pro-environmental actions in their day to day lives more often than students who reported a lower amount of engagement. While a direct causal relationship cannot be confirmed in this study, it is likely that student exposure to campus conservation initiatives results in a greater sense of environmental stewardship in general and may encourage pro-environmental action outside the university setting.

5.0 Discussion

Study results suggest that conservation-oriented projects on campus provide important social benefits to the student body. Many students reported that the presence of such projects increased their overall satisfaction at Marshall University. This was especially true for students who had a high level of knowledge or engagement with existing campus conservation projects(r = .334, p <.001). Further, the majority of students indicated that the university's efforts in relation to conservation and sustainability were personally important to them. These results are similar to those of Emanuel and Adams (2011), who found that the majority of students in Alabama and Hawaii believed that universities should make sustainability a top priority in their planning, development, and operations. Clearly, campus-level environmental conservation and sustainability have become important considerations for contemporary college students.

Although campus conservation initiatives improve the college experience for many students, several respondents in this study reported a lack of knowledge and/or engagement with the existing conservation projects on campus, suggesting that the full potential of such projects for benefiting and educating the student body has not been reached. Emanuel and Adams (2011) reported that only a minority of college students reported knowing a great deal about the environment, with nearly one-third of students indicating that they did not know much about sustainability. This lack of knowledge about the environment and sustainability, coupled with a clear indication that students feel these topics are important, suggests that additional actions should be taken to increase the effectiveness of campus conservation projects. Results of several survey questions suggest that the addition of on-site educational signage at conservation project locations would increase the social benefits that they provide at Marshall University. Personal exploration on campus was the most common way that students learned about such initiatives. Also, increased advertisement and education of existing facilities was the most common suggestion that students provided for additional actions that could be taken to promote conservation and sustainability (a full list of open-ended student suggestions could not be included in the paper due to space requirements). On-site signage would also effectively reach non-student community members and university visitors, thereby extending educational messages to students who are not enrolled in scientific disciplines as well as community members not belonging to the student body.

Consistent with previous research (e.g., Thapa, 1999), the attitude-behavior relationship found in this study was weak (r = 096). It seems that the six-item version of the NEP scale was not successful in explaining general pro-environmental behaviors among the student body. Several previous studies have attempted to explain this weakness by pointing to a discrepancy in the specificity between attitudinal and behavioral measures (i.e., general attitudes are not well-suited for explaining specific behaviors). The behavioral items used in this study, however, were fairly general and were not specific to any cause or campaign. Results may suggest, as others have argued, that there simply is not a strong relationship between environmental attitudes and behaviors. Alternatively, some have argued that the lack of a strong relationship may be due to issues related to the variables' measurement.

Those subscribing to the latter school of thought may find more success with alternative measures of environmental attitudes, as the NEP has consistently provided only weak explanatory power in relation to environmental behaviors.

Finally, results suggest that there is a relationship between student knowledge and/or engagement with campus conservation initiatives and personal behaviors that promote conservation and sustainability. While a direct causal relationship cannot be confirmed in this study, it is likely that exposure to campus conservation efforts results in a greater sense of environmental stewardship in general. Evidence suggests that at least some students are taking the conservation messages from campus initiatives and incorporating them into other aspects of their lives. Alternatively, it may be the case that students who are already prone to taking pro-environmental actions tend to seek out and engage with campus conservation initiatives more than other students who are less proactive about the environment. Additional research is needed to illuminate the causal order of this relationship and to identify the various factors that influence student engagement (or disengagement) with campus conservation initiatives.

References

ACUPCC.ORG (2015). *American College and University Presidents' Climate Commitment*. Retrieved from http://acupcc.org/.

Coy, A. E., Farrell, A. K., Gilson, K. P., Davis, J. L., & Le, B. (2013). Commitment to the environment and student support for " green" campus initiatives. *Journal of Environmental Studies and Sciences, 3*(1), 49-55.

Dillman, D. A., Smyth, J. D., & Christian, L. M. (2009). *Internet, mail, and mixed-mode surveys: The tailored design method* (3rd ed.). Hoboken, NJ: John Wiley & Sons Inc.

Dunlap, R. E., VanLiere, K. D., Mertig, A. G., & Jones, R. E. (2000). Measuring endorsement of the new ecological paradigm: A revised NEP scale. *Journal of Social Issues, 56*(3), 425-442.

Emanuel, R. & Adams, J. N. (2011). College students' perceptions of campus sustainability. *International Journal of Sustainability in Higher Education, 12*(1), 79-92.

Smith, A. A., & The Student Environmental Action Coalition. (1993). *Campus ecology: A guide to assessing environmental quality and creating strategies for change.* Los Angelas, CA: Living Planet Press.

Thapa, B. (1999). Environmentalism: The relation of environmental attitudes and environmentally responsible behaviors among undergraduate students. *Bulletin of Science, Technology, and Society, 19*(5), 432-444.

Theodori, G. L. & Luloff, A. E. (2002). Position on environmental issues and engagement in proenvironmental behaviors. *Society and Natural Resources, 15*, 471-482.